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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/770,541	01/26/2001	Prithviraj Banerjee	NWU-P001	6788

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EXAMINER	
CHU, CHRIS C	

ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 04/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/770,541	BANERJEE ET AL.	
	Examiner	Art Unit	
	Chris C. Chu	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 January 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *18 - 37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *18 - 37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on January 28, 2005 has been received and entered in the case. However, applicant's amendment is not persuasive.

Claim Objections

2. Claims 34 – 37 are objected to because of the following informalities:

(A) In claims 34 – 37, under the revised amendment practice, added text must be shown by underlining. For example, "[The method of claim 33,]" should be -- The method of claim 33, --.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 18 - 37 are rejected under 35 U.S.C. 102(e) as being anticipated by Bowen (U.S. Pub. No. US2002/0100029).

Regarding claims 18, 25 and 26, Bowen discloses in e.g., Fig. 2 and pages 19 - 32 a method for compiling a functional description expressed in an interpretive, algorithmic language into target code for selected hardware, the method comprising the steps of:

- A parser parsing (parser 204; page 6, section 0113) the functional description expressed in the interpretive, algorithmic language with at least one undeclared variable (since the term "undeclared variable" is not clearly defined in the specification of instant invention, any temporary or unsigned variables used in "if", "while" or "for" statements i.e., **ir** in page 20, line 14 of Bowen read as the "undeclared variable". Thus, Bowen fully meets this limitation.) into an abstract syntax tree (page 6, section 0113 and pages 19 - 32);
- A type-shape analyzer (206; page 6, section 0114), coupled to the parser (see Fig. 2), for inferring a type (e.g., switch(ir)) and a dimension (e.g., while (ir != STOP)) to the undeclared variable (e.g., ir) by analyzing the use of the undeclared variable in the abstract syntax tree (i.e., Figs. 9A – 9D, page 10, section 0200 and pages 19 - 32);
- assigning the inferred type and dimension to the undeclared variable (i.e., Figs. 9A – 9D and pages 19 - 32);
- a statement deconstructor (210; page 7, section 0132 and page 10, sections 0200 – 0208), coupled to the type-shape analyzer (see Fig. 2), for transforming a compound statement in the abstract syntax tree into a series of single statements (claim 1) and at least one simple statement (e.g. claim 26; The program statements in page 20 enter a loop with transmitted position data that is received from the page 19 and send back the result or new position data to page 19 to display process. Thus, a series of the end

statement in the loop in page 20 to have the positions as shown in Fig. 8 of Bowen read as a "series of single statements".); and

- a translator (212; page 7, section 0140), coupled to the statement deconstructor (claim 25; see Fig. 2), for translating the abstract syntax tree into a register transfer level format.

Regarding claims 19, 27 and 34, Bowen discloses in e.g., Fig. 2 and pages 19 - 32 further comprising: a user directive file (202), coupled to the parser, for annotating the functional description with at least one user defined directive selected from the group consisting of constraint directives, assertions, and compiler hints.

Regarding claims 20, 28 and 35, Bowen discloses in e.g., Fig. 2 and pages 19 - 32 further comprising: a precision analyzer (pages 23 - 26), coupled to the type-shape analyzer, for determining the precision of the at least one undeclared variable and analyzing a value range of the at least one undeclared variable.

Regarding claims 21 and 29, Bowen discloses in e.g., Fig. 2 and pages 19 – 32 further comprising: a real number parser (pages 23 - 26), coupled to the precision analyzer, for parsing a real number into an integer part and a fractional part. wherein said real undeclared variable is one of said at least one undeclared variable.

Regarding claims 22, 30 and 36, Bowen discloses in e.g., Fig. 2 and pages 19 – 32 further comprising: a memory access optimizer (Figs. 9A – 9D and pages 19 – 32), coupled to the statement deconstructor, for analyzing array access patterns across loop iterations and replacing a statement in a loop including a memory access with multiple statements including the memory access to reduce the number of individual memory accesses.

Regarding claims 23, 31 and 37, Bowen discloses in e.g., Fig. 2 and pages 19 – 32 further comprising: a pipeline optimizer (Figs. 9A – 9D and pages 19 – 32), coupled to the statement deconstructor, for analyzing compound loop structures to identify pipeline opportunities and applying the pipeline algorithm to pipeline opportunities to generate nodes corresponding to the loop body, predicate nodes corresponding to loop conditional statements, and a schedule for scheduling pipeline operations.

Regarding claims 24 and 32, Bowen discloses in e.g., Fig. 2 and pages 19 – 32 the statement deconstructor for transforming a compound statement in the abstract syntax tree into at least one simple statement comprises: a scalarizer (i.e., codes in the page 24, Figs. 9A – 9D and pages 19 – 32), coupled to the type-shape analyzer, for expanding a matrix operation into at least one loop.

Regarding claim 33, Bowen discloses in e.g., Fig. 2 and pages 19 – 32 one or more computer readable storage devices having computer readable code embodied on said computer readable storage device, said computer readable code for programming one or more computers to perform a method for compiling a functional description expressed in an interpretive, algorithmic language into target code for selected hardware, the method comprising the steps of:

- parsing (204) the functional description expressed in the interpretive, algorithmic language with at least one undeclared variable into an abstract syntax tree (page 6, section 0113 and pages 19 – 32);
- inferring a type and a dimension to the undeclared variable by analyzing the usage of the undeclared variable in the abstract syntax tree (i.e., Figs. 9A – 9D and pages 19 - 32);

- assigning (i.e., Figs. 9A – 9D and pages 19 - 32) the inferred type and dimension to the undeclared variable;
- transforming (210) compound statements in the abstract syntax tree into a series of single statements; and
- translating (212) the abstract syntax tree into a register transfer level format.

Response to Arguments

5. Applicant's arguments filed on January 28, 2005 have been fully considered but they are not persuasive.

On page 10, applicant argues that Bowen does not disclose the claimed parser for "parsing the functional description expressed in the interpretive, algorithmic language with ***at least one undeclared variable*** into an abstract syntax tree." This argument is not persuasive. Since the term "undeclared variable" is not clearly defined in the specification of instant invention, any temporary or unsigned variables used in "if", "while" or "for" statements i.e., **ir** in page 20, line 14 of Bowen read as the "undeclared variable". Thus, Bowen fully meets this limitation. Furthermore, since Bowen's program may use in a video game (see page 9, sections 0177 – 0186), the Bowen's program must have loop statements that calculate the movements of the game character. To do this calculation, inherently Bowen must have many temporary or unsigned or "undeclared" variables to compile the loop statement.

Further, applicant argues "Fig. 9 does not describe or illustrate 'assigning and inferred type and dimension to an undeclared variable'." This argument is not persuasive. as explained in the above paragraphs, Bowen discloses in e.g., Figs. 9A – 9D, page 10, section 0200 and pages 19 – 32 assigning and inferred type (e.g., switch(ir)) and dimension (e.g., while (ir != STOP)) to an undeclared variable (e.g., ir).

Furthermore, applicant argues that Bowen does not disclose a limitation "for transforming a compound statement in the abstract syntax tree into at least one simple statement." This argument is not persuasive. The program statements in page 20 of Bowen enter a loop with transmitted position data that is received from the page 19 and send back the result or new position data to page 19 to display process. Thus, the end statement in the loop in page 20 to have the positions as shown in Fig. 8 of Bowen read as a "simple statement". Furthermore, inherently any loop statement has one simple sentence that contains a name of receiver, a name of sender, at least one undeclared variable and a range of numbers for the calculation. Thus, this simple sentence in the loop of Bowen read as the "simple statement".

Finally, applicant argues Bowen does not disclose translating the abstract syntax into a register transfer level format. This argument is not persuasive. Bowen clearly discloses in page 7, section 0140 that the element 212 translates the description into RT-level description. Thus, Bowen fully meets the claimed invention.

For the above reasons, the rejection is maintained.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is 571-272-1724. The examiner can normally be reached on 11:30 - 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 517-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chris C. Chu
Examiner
Art Unit 2815

c.c. C.C.
Tuesday, April 05, 2005

A. M. Thompson
Primary Examiner
Technology Center 2800